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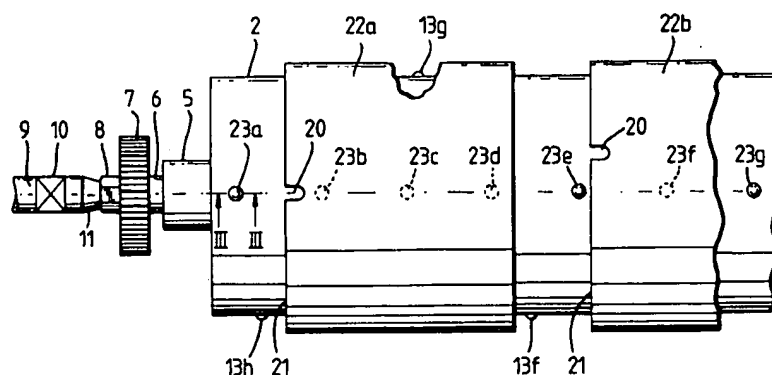
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54 Apparatus relating to a printing unit.

57 The invention relates to an apparatus relating to a printing unit including a printing roll (1) which comprises a printing roll core (2) and one or a plurality of printing sleeves (22a-22d) carrying the pattern to be printed, which printing sleeves can be mounted on the core from one end thereof and be displaced along and turned around the core to and from a number of register positions on the core. The said register positions are defined by a number of registration means (23a-23b...) which project from the cylindrical surface of the core. The sleeves (22a-22d) are provided with a recess (20) or the like in at

least one end (21) thereof, which recess or the like can cooperate with said projecting registration means for the mounting (register) of each sleeve in its intended position. The registration means may resiliently be pressed entirely into the shell of the printing roll core, so that the sleeve or the sleeves may be displaced beyond those registration means which are pressed into the core in order that they may reach with its recess to and be brought into matching engagement with that registration means which defines the chosen register position for each sleeve.

Fig. 2.



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TECHNICAL FIELD

This invention concerns an apparatus relating to a printing unit including a printing roll which comprises a printing roll core and one or a plurality of printing sleeves carrying the pattern to be printed, which printing sleeves can be mounted on the core from one end thereof and be displaced along and turned around the core to and from a number of register positions on the core.

BACKGROUND OF THE INVENTION

When starting the printing of multi-colour prints, the printing units following after one another must be in register with each other, in other words be positioned so that the colour images are accurately matched or superimposed on the finished print. When using printing rolls of the above mentioned type, this can be achieved therein that the printing sleeves carrying the printing pattern are displaced along and turned around the printing core to the intended registering position, where the sleeves are tightly secured. For the displacement and the turning of the sleeves on the core there is used a system using compressed air which is caused to flow out through passages terminating in outlets distributed along the outer surface of the core, so that the sleeves may be caused to expand from fitting positions in which compressed air does not flow out through said outlets, wherein the sleeves may be displaced along and turned around the core. Suitably the compressed air passages may be connected to a source of compressed air which advantageously is common for the various passages. In each of these passages may be provided a valve, wherein each of said valve includes an opening member having an outer portion extending beyond the outer surface of the cylindrical core when the valve is closed and said outer portion is in its outer position, said outer portion being displaceable through outer mechanical action from said outer position to an inner position essentially interior or coinciding with the outer surface of the core, wherein the valve is opened such that compressed air may flow out through the opening in the surface of the core, said mechanical action being performed by the sleeve as said sleeve is being mounted on the core, wherein the valves are successively opened as the sleeve is brought into contact with their outer portions and are closed again when the sleeve has passed the opening in question. This system has great advantages but it accentuates the complex of problems relating to registering the sleeves on the core.

BRIEF DESCRIPTION OF THE INVENTION

The purpose of the invention is to provide a system which facilitates a quick but still very accurate registration of printing rolls of the type comprising one or a plurality of sleeves carrying the pattern to be printed, which printing sleeves can be mounted on the core from one end thereof and be displaced along and turned around the core to and from a number of register positions on the core. These and other objectives can be achieved therein that said register positions are defined by a number of registration means which may project from the cylindrical surface of the core, that the sleeves in at least one edge thereof are provided with at least one recess or the like provided to cooperate with the said projecting registration means for mounting (registering) each sleeve in its intended position, and that said registration means can adopt two different states, namely a print state in which the registration means projects from the cylindrical surface of the core, and a second state in which it is contained entirely within the core, allowing the sleeve or the sleeves to be displaced beyond those registration means which have adopted their said second state in order that the sleeve may reach that registration means which in its said first state defines the chosen register position for each printing sleeve, adopting the register position through matching engagements between the registration means and the said recess in the edge of the printing sleeve.

The registration means which advantageously are of a spring return type are suitably provided along a straight line, in other words in parallel with the center axis of the printing roll. However, in principle also resilient registration means of the spring return type provided in various positions around the periphery of the printing core may be conceived. Further the sleeves may be provided with more than one recess in one edge or in both edges of the sleeve in order to increase the freedom of choice as far as the registration is concerned.

Further features and aspects of the invention will be apparent from the accompanying claims and from the following description of a preferred embodiment.

BRIEF DESCRIPTION OF DRAWINGS

In the following description of a preferred embodiment, reference will be made to accompanying drawings, in which,

Fig. 1 shows a printing roll provided with a plurality of printing sleeves mounted side by side on a printing core,

Fig. 2 in larger scale shows the driving end of the printing roll, illustrating the mounting operation of two sleeves on

- the core,
 Fig. 3 in a still larger scale shows a registration means along a line III-III in Fig. 2,
 Fig. 4 shows a longitudinal section through the printing roll core, and
 Fig. 5 shows the encircled portion in Fig. 4 in a larger scale.

DESCRIPTION OF PREFERRED EMBODIMENT

A printing roll has been generally designated 1, Fig. 1. It consists of a printing roll core 2 which can be cylindrical, slightly tapered or slightly stepped. Two end portions have been designated 3 and a pair of axle shafts have been designated 5. In the driving end there is a driving shaft 6 and on the driving shaft a gear wheel 7. Compressed air can be supplied to the interior of the printing core 2 via a connection nozzle 8 in the driving shaft 6 through a hose 9 for compressed air, Fig. 2, from a source of supply of compressed air, not shown. In hose 9 there may optionally be provided a valve for opening and closing the connection. The supply of compressed air may be effected either by opening the valve 10 or by connecting the mouthpiece 11 of hose 9 to the connection nozzle 8 of the axle shaft 5. When closing the supply the operation is reverse. In the interior of the printing roll core 2 is a fill body 12 of rigid cellular plastic material which reduces the air volume in the interior of the core to the thin gaps between on one side the cylindrical portions of the printing roll core as well as its end portions and on the other side the said fill body 12.

In the cylindrical shell of the printing roll core 2 there is in a manner known per se provided a number of passages 14. In each such passage is a non-return valve 13a, 13b ... 13h. The design of such a valve 13a is shown in Fig. 5, which shows that the valve is a ball valve having a valve seat 15, the outer angular border line of which essentially coincides with the outer cylindrical surface of printing roll core 2. A steel ball 17 is pressed towards the seat 15 by means of a spring 18. In the closing position of the valve, the ball 17 extends beyond the outmost part of valve seat 15 and also beyond the outer surface of printing roll core 2 by an outer portion 19 which has the shape of a spherical calotte.

In the embodiment shown in Fig. 4 four sleeves 22a-22d have been mounted on the printing roll core 2. The sleeves can consist e.g. of reinforced plastics and on the plastic material a cliché, or consist of an interior sleeve of reinforced plastic material and on this sleeve rubber with the printing pattern. The construction of the sleeves, as far as the material technology is concerned, however, does not form any part of the present invention. Therefore materials or material combinations other

than those which are mentioned here may be conceived. But it is a characteristic feature of the invention that each printing sleeve 22a-22d is provided with at least one recess 20 in that edge 21 of the sleeve which initially is mounted on the printing roll core 2.

According to the invention the printing roll core 2 is provided with an plurality of register means in the form of radially projecting pins 23a, 23b ... 23g arranged along a straight line along essentially the whole length of the printing roll core. The design of such a register pin 23a is shown in Fig. 3. The pin 23a consists of a cylindrical portion 24 which is slidably provided in the radial direction in the opening 25 of a socket 26 which is male threaded and screwed into a boring 27 in the shell of the printing roll core 2. The pin 23a is rounded in its outer end 28 and exhibits inside the socket 26 a flange 29 which in normal position is biased against the end portion of the socket adjacent the opening 25. A biasing spring 30 is provided between the bottom of boring 27 and said flange 29. The cylindrical portion 24 of pin 23a has a diameter which coincides with the breadth of the recess 20 in the sleeves 22a-22d and the rounded bottom of recesses 20 has also a radius corresponding with the radius of said cylindrical portion 24.

When the printing sleeves 22a-22d shall be mounted on the core 2 the compressed-air hose 9 is connected to the mouth-piece 8 and valve 10 is opened, so that the interior of core 2 is subjected to over pressure. No air, however, will flow out through the valves 13a-13h, as these valves initially are closed. The first sleeve 22a is initially mounted in the right hand portion of the core 2, which in this case is the mounting end of the core. The end portion 32 therefore advantageously is slightly tapered in order to facilitate the initial part of the mechanical mounting operation. When the sleeve 22a thus has been mounted so far that it has passed the tapered portion 32, the sleeve will with its interior side press the balls 17 into the valves 13a under compression of spring 18. Herein the valves are opened in a manner known per se and air flows out through the valves from the interior of core 2 such that the sleeve 22a will be expanded to a sufficient degree in order that it readily may be further moved over the core 2. In order that the sleeve 22a shall be mounted on the left hand part of the printing roll core 2, as shown in Fig. 1, however, it has to pass the register means 23k, 23j ... 23b. This is made possible therein that the register pins may be pushed into the shell of the printing roll core 2 under compression of the springs 30. The inward pressing of the register pins is made by hand, wherein the sleeve 22a successively is brought to pass all the register pins prior to the register pin 23a. If necessary the sleeve 22a

is turned a little, so that the recess 20 can be brought into matching engagement with register pin 23a. The subsequently following sleeves 22b, 22c and 22d are handled correspondingly, such that each of the sleeves successively is registered by engagement between recesses 20 and register pins 23d, 23g, and 23j, respectively, Fig. 1. When all the sleeves 22a-22d have been mounted, a final control may be made to ensure that all the operating register pins are in engagement positions in the bottom of the recesses 20. Thereupon the supply of compressed air to the interior of core 2 is discontinued, wherein the printing sleeves spring back to their fitting engagements with the outer surface of the printing roll core 2.

In the described embodiment a printing roll 1 has been shown with four sleeves 22a-22d being equally long on a printing roll core 2. The number of sleeves, however, may vary. They need not always cover essentially the whole of the length of the printing roll core but may very well cover only a minor part of it. They may also be narrower as well as broader than the shown sleeves in relation to the length of the printing roll core, and they may also have different lengths. The positioning on core 2 may also be chosen within wide limits, which is made possible by the comparatively large number of register means 23a-23k and through the combination with the valve provided outlets for compressed air in the shell of the printing roll core. One might very well conceive to usually have only a single sleeve extending along the major part of the length of the printing roll core and that only occasionally one or more narrower sleeves are used. It is a very important advantage of the invention that it enables all these alternatives which can be combined in many different ways. Also the number of resilient register means, the distances between them as well as their positions may be varied.

Claims

1. Apparatus relating to a printing unit including a printing roll (1) which comprises a printing roll core (2) and one or a plurality of printing sleeves (22a-22d) carrying the pattern to be printed, which printing sleeves can be mounted on the core from one end thereof and be displaced along and turned around the core to and from a number of register positions on the core, **characterized** in that said register positions are defined by a number of registration means (23a, 23b ...) which may project from the cylindrical surface of the core, that the sleeves (22a-22d) in at least one edge (21) thereof are provided with at least one recess (20) or the like provided to cooperate with the said projecting registration means for mounting (registering) each sleeve in its intended position, and that said registration means can adopt two different states, namely a print state in which the registration means projects from the cylindrical surface of the core, and a second state in which it is contained entirely within the core, allowing the sleeve or the sleeves to be displaced beyond those registration means which have adopted their said second state in order that the sleeve may reach that registration means which in its said first state defines the chosen register position for each printing sleeve, adopting the register position through matching engagements between the registration means and the said recess in the edge of the printing sleeve.
2. Apparatus according to claim 1, **characterized** in that said registration means are of a spring return type so that they can be resiliently pressed entirely into the printing core.
3. Apparatus according to claim 1 or 2, **characterized** in that the registration means are arranged along a straight line along the printing roll core.
4. Apparatus according to any of claims 1-3, **characterized** in that the sleeve/sleeves may be displaced along and turned around the core to and from register positions on the core by causing compressed air to flow out through valves (13a, 13b ...) distributed along the core, so that the sleeve/sleeves from a state in which the sleeve tightly fits the core, when compressed air is not caused to flow through said valves, may be expanded so that the sleeve/sleeves may be displaced along and turned around the core.
5. Apparatus according to claim 4, **characterized** in that each such valve (13a, 13b ...) includes an opening member (17-19) having an outer portion (19) extending beyond the outer surface of the shell of the core when the valve is closed and said outer portion is in its outer position, said outer portion being displaceable through outer mechanical action from said outer position to an inner position essentially interior or coinciding with the outer surface of the core, wherein the valve is opened such that compressed air may flow out through the valve, which mechanical action may be caused by the sleeve when the sleeve is being mounted on the core, wherein the valves are successively opened as the sleeve is brought into contact with their outer portions and are closed

again when the sleeve has passed the opening in question.

6. Apparatus according to any of claims 2-5, **characterized** in that said resilient registration means consists of a pin (23a) which is slidably journaled in an opening (25) in the shell of the core, and that a return spring (30) is provided in a boring (27) interior of said pin. 5
7. Apparatus according to claim 6, **characterized** in that said register pin (23a) is slidably journaled in a socket (26) which is mounted in said boring (27). 10

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Fig. 1.

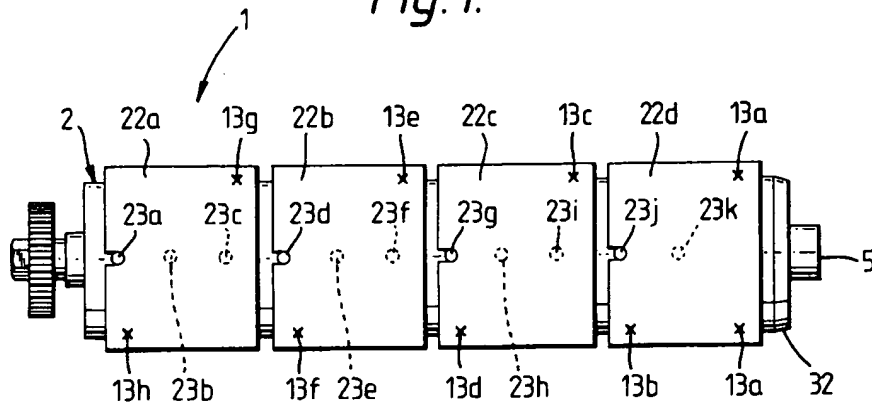


Fig. 2.

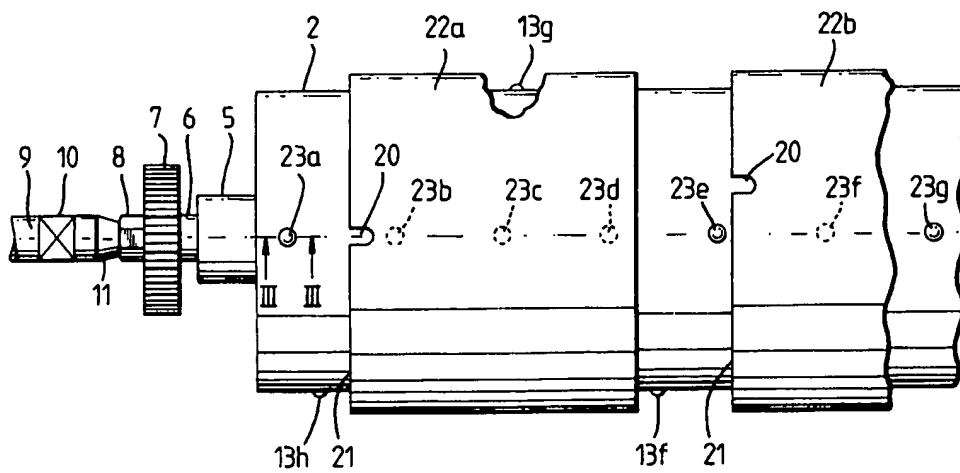


Fig. 3.

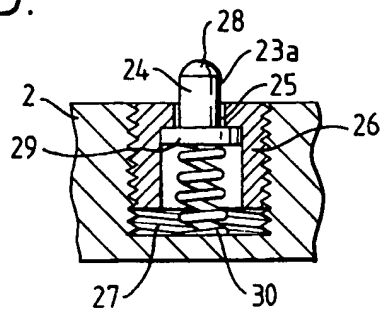


Fig. 4.

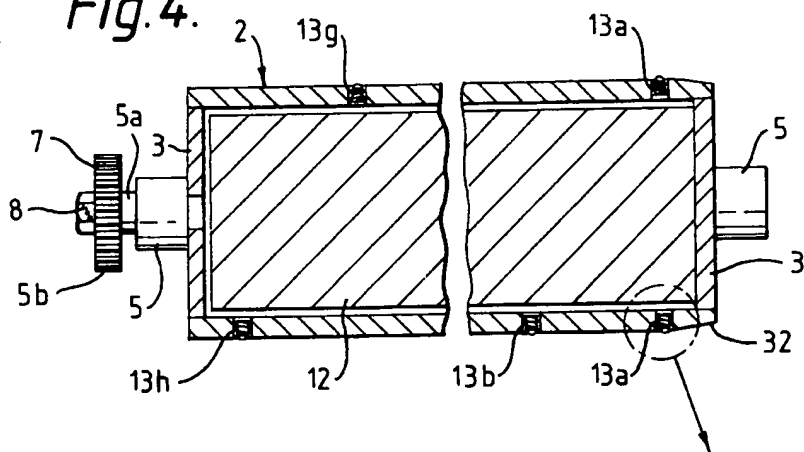
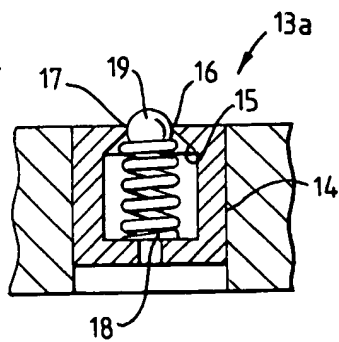


Fig. 5.





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EUROPEAN SEARCH REPORT

Application Number

EP 92 20 0962

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	GB-A-154 325 (TERREY) * the whole document *	1	B41F27/10
A	WO-A-9 104 155 (GRAPHICS AKTIEBOLAG) * the whole document *	4	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			B41F
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 23 JULY 1992	Examiner EVANS A.J.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			